

Preblessing

t̄ CROSS-SECTION WITH JET PROBABILITY

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Top Meeting
August 5, 2004

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Motivation and Analysis Setup

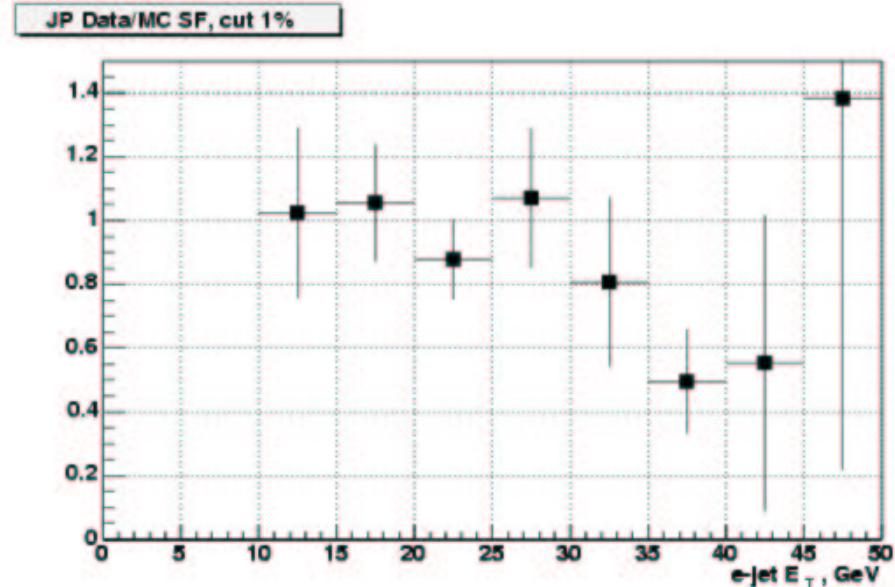
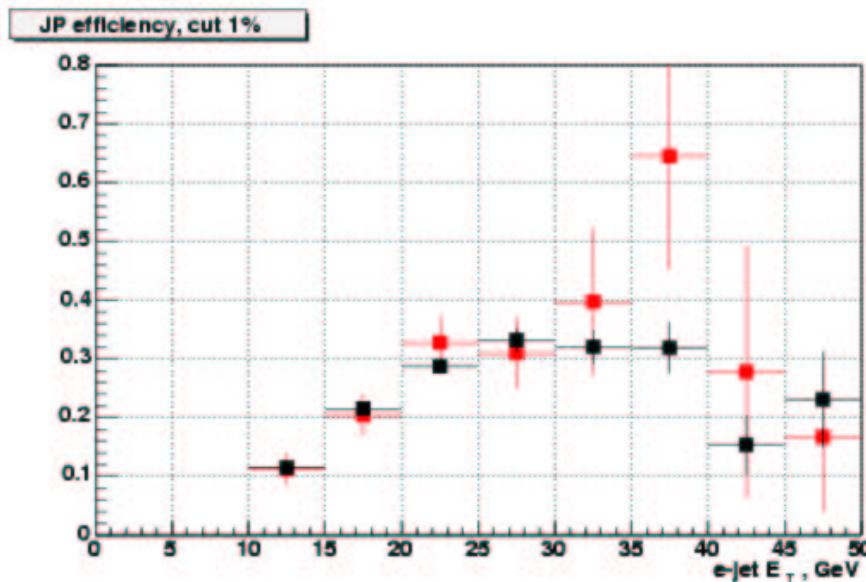
- Motivation
 - ◊ Cross check $t\bar{t}$ x-section measurement with a different tagging algorithm
 - ◊ JP provides (a priori) a more flexible way to understand the composition of the tagged sample by tuning the JP cut
 - ◊ JP can be tuned/optimized differently for other kind of analysis
- Setup of the analysis
 - ◊ We use v.4.11 offline (Data sample $\sim 162 \text{ pb}^{-1}$).
 - * Jet Probability parametrization (provided by the Florida group) is only available in this release

Motivation and Analysis Setup

- ◊ In this first analysis pass, we define as tagged jets those with positive $\text{JP} < 0.01$ (**no** attempt has been done to make an optimization cut). We choose this cut to cross-check ourselves with SECVTX since with this cut the performance of JP (efficiency and purity) is similar to SECVTX algorithm
- ◊ We have remade the official Top ntuples in order to include the JP information for the samples of lepton+jets data, $t\bar{t}$ MC, W+HF and W+jets backgrounds, diboson, $Z \rightarrow \tau^+\tau^-$ and single top
- All the results are in
www-cdf.fnal.gov/internal/physics/top/RunIIPWjets/webpages/jetprob/cdfonly.html

Jet Probability Overview

- Jet Probability algorithm is described in CDF note 6315
- Efficiencies and scale factors are described in CDF note 6931



JP < 0.01 \Rightarrow

$$\epsilon^{data} = 0.197 \pm 0.006 \pm 0.004 \pm 0.01$$
$$\epsilon^{MC} = 0.25 \pm 0.20$$

Jet Probability Overview

- ★ The weighted average of the slope of the SF vs E_T^{jet} is compatible with zero

Sample	SF Slope vs E_T^{jet}
Incl. elec.	-0.0173 \pm 0.0076
Jet 50	0.00057 \pm 0.00085
Incl.jets	0.00403 \pm 0.00193
Weighted average	0.00094 \pm 0.00077 GeV

so we consider the SF independent of E_T^{jet} and we use the value

$$\text{SF} = 0.787 \pm 0.105$$

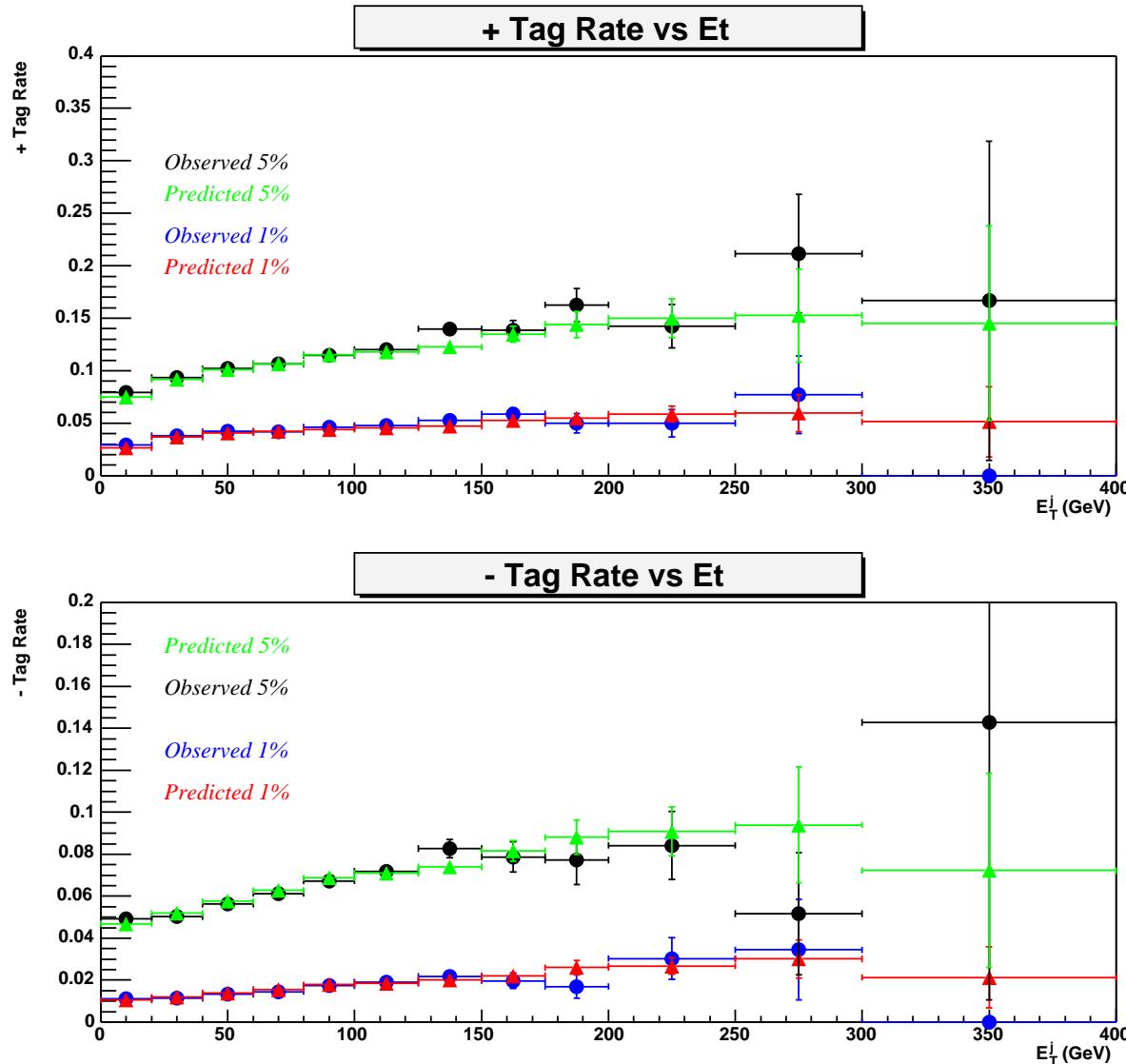
- ★ Errors include statistical uncertainty, error from F_B measurement and uncertainty due to mistag asymmetry

Jet Probability Overview

- Mistag Matrix is described in CDF note 6913. The tag rate is parametrized as a 5×1 dimensional matrix of the following variables: $(E_T, N_{trk}, \sum E_T^j, \eta, Z_{vtx}) \times \phi$
 - ★ From inclusive jet samples:
Overall negative tag rate = $1.11\% \pm 0.06\%$
Overall positive tag rate = $3.22\% \pm 0.21\%$
 - ★ This study does **not** include systematic uncertainties neither from HF contribution to the negative tags nor material interaction contribution to the positive tags.
 - ★ Since mistag rate for positively tagged jets is slightly higher than the negative mistag rate, instead of scaling up the negative tag rate we assign an extra +20% error on the mistag taken from SECVTX studies on tagging composition (we plan to do the tagging composition study using gen5)

Jet Probability Overview

- ★ Tag rate prediction from inclusive jet data tested on $\sum E_T$ sample



Data Sample

- The data sample is based on all data taken until September'03 shutdown (run range 141544 - 167715)
- We use DQM goodrun list version 4.0
- Runs excluded: 164844 (luminosity not well determined), 163463 and 163474 (bad beamline)
- Include runs with good SVX information
- Integrated luminosity (pb^{-1})

CEM	CMUP	CMX
161.6 ± 9.5	161.6 ± 9.5	149.8 ± 8.8

Event Selection

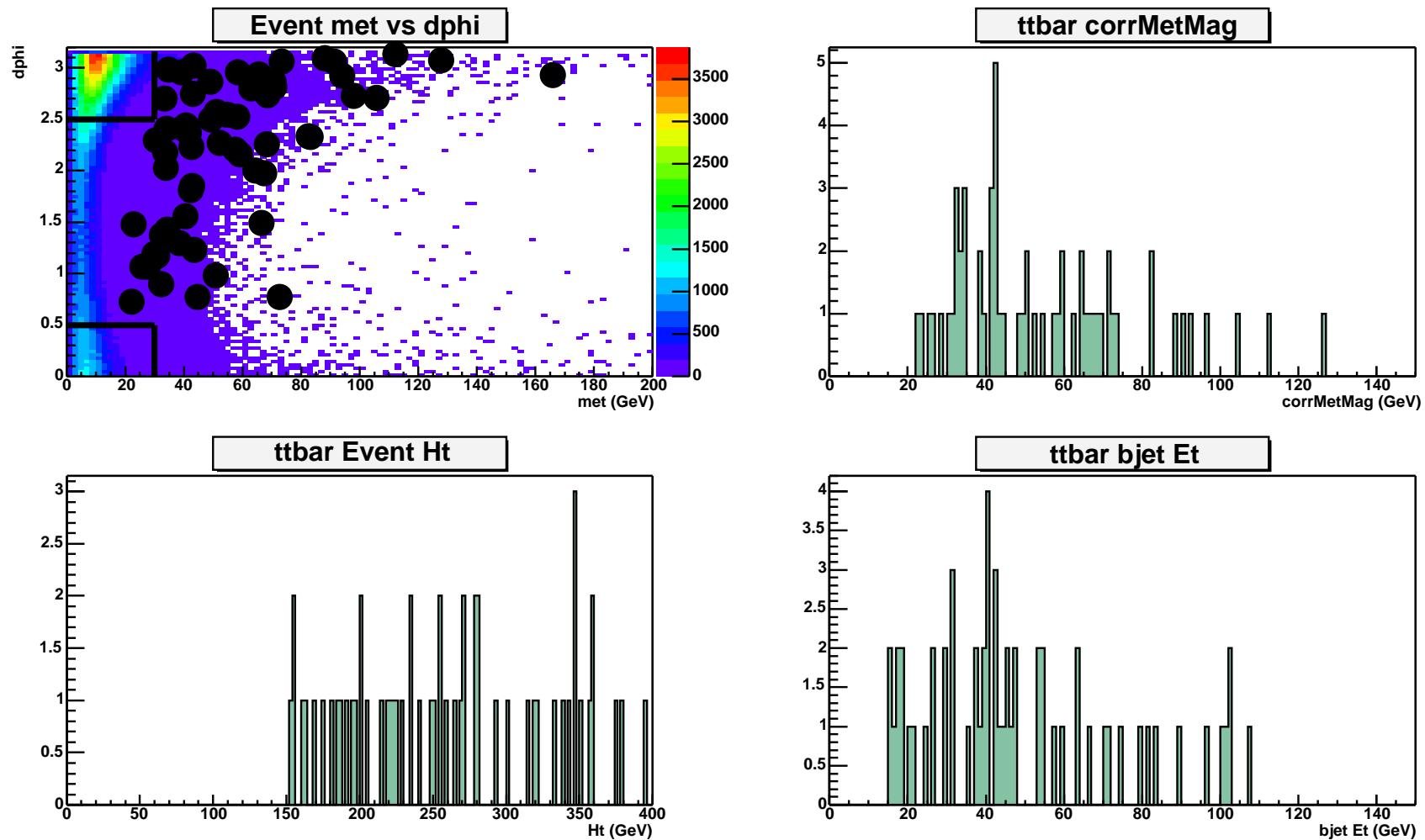
- Our event selection is based on the standard Lepton+jets selection (CDF Note 6844)
- We apply the QCD veto but not the H_T cut
- Number of selected pretag and tagged events vs jet multiplicity

Jet Multiplicity	1 jet	2 jet	3 jet	≥ 4 jets
Pre-tag events				
CEM	7819	1202	201	61
CMUP	3758	587	81	27
CMX	1971	293	36	6
Total	13548	2082	318	94
Tagged events				
CEM	78	40	21	17
CMUP	40	30	8	10
CMX	13	11	2	1
Total	131	81	31	28

- Event is tagged if it contains, at least, one jet with positive $JP < 0.01$

Event Selection

- Some $t\bar{t}$ event candidate plots:



Event Selection

- Candidate events and % overlap between JP, SECVTX and Loose SECVTX
 - ◊ Single tag:
 - ★ JP selects 59 events, SECVTX (*) 47 and Loose SECVTX (**) 91
 - Overlap JP/SECVTX = $35/47 = 74.5\%$
 - Overlap Loose SECVTX/JP = $47/59 = 79.7\%$
- (*) For this comparison, we have remade the SECVTX selection including QCD cut
- (**) Loose SECVTX makes a slightly different kinematical selection (z vertex) and no QCD cut is applied.

Event Selection

- ◊ Double tag:
 - * JP selects **11** events (18.6% of the single tag), SECVTX **8** (17%) and Loose SECVTX **19** (20.6%)
 - Overlap JP/SECVTX = $6/8 = 75\%$
 - Overlap Loose SECVTX/JP = $10/11 = 91\%$
 - From the 19 Loose SECVTX double tagged events, 10 are also double tagged by JP and 8 are single tagged by JP
- ◊ Overlap in $t\bar{t}$ Monte Carlo:
 - * Overlap JP/SECVTX = 89%
 - * Applying scale factors: JP/SECVTX = 79%

$t\bar{t}$ Acceptance

- $t\bar{t}$ event detection efficiency is defined as

$$\epsilon_{t\bar{t}} = A_{t\bar{t}} \times \epsilon_{z_0} \times \epsilon_{lepton\ id} \times \epsilon_{iso} \times \epsilon_{veto} \times \epsilon_{trig} \times \epsilon_{tag\ event}$$

- We used ~ 685000 PYTHIA Monte Carlo events with top mass $175\ GeV/c^2$ (TTOPLI)
- We reproduced the acceptances of the standard kinematical selection (CDF note 6844)
- In what follows, we will use the same kinematic efficiencies, scale factors and errors:

Quantity	CEM	CMUP	CMX
ϵ_{tt}	0.0409 ± 0.0033	0.0212 ± 0.0021	0.0095 ± 0.0012

- Errors include stat (1%) and syst (8.7%)

tt> Acceptance

- Summary of acceptances and Jet Probability tagging efficiencies for tt> events

Quantity	CEM	CMUP	CMX
JP (QCD cut applied, SF = 0.787 ± 0.105)			
Acc. No Tag	$4.09 \pm 0.04 \pm 0.33$	$2.12 \pm 0.02 \pm 0.21$	$0.95 \pm 0.01 \pm 0.12$
Tag Eff	$56.99 \pm 0.28 \pm 6.66$	$56.88 \pm 0.36 \pm 6.67$	$57.84 \pm 0.60 \pm 6.67$
Average Tag Eff	$57.24 \pm 0.21 \pm 3.85$		
Acc. with Tag	$2.33 \pm 0.03 \pm 0.33$	$1.21 \pm 0.01 \pm 0.19$	$0.55 \pm 0.01 \pm 0.09$
Lum (pb^{-1})	161.6 ± 9.5	161.6 ± 9.5	149.8 ± 8.8
$\epsilon_{tt} \int L dt$	$3.77 \pm 0.23 \pm 0.58$	$1.95 \pm 0.12 \pm 0.32$	$0.82 \pm 0.05 \pm 0.15$
SECVTX (QCD cut not applied, SF = 0.81 ± 0.07)			
Tag Eff	$52.2 \pm 0.386 \pm 3.68$	$51.9 \pm 0.492 \pm 3.66$	$53.6 \pm 0.804 \pm 3.78$
Average Tag Eff	$52.3 \pm 0.284 \pm 3.69$		
$\epsilon_{tt} \int L dt$	$3.65 \pm 0.04 \pm 0.47$	$1.90 \pm 0.02 \pm 0.24$	$0.80 \pm 0.01 \pm 0.10$

Mistags

- We obtain the mistag contribution to the background by applying the negative tag rate matrix to the events in the pretag sample

Jet Multiplicity	1 jet	2 jets	3 jets	≥ 4 jets
Mistag matrix prediction				
Mistag electrons	24.1 ± 1.8	9.08 ± 0.95	2.87 ± 0.03	1.42 ± 0.03
Mistag muons	17.0 ± 1.6	5.76 ± 1.05	1.57 ± 0.08	0.83 ± 0.01
Total	41.1 ± 2.5	14.84 ± 1.66	4.44 ± 0.09	2.26 ± 0.03

- Errors are only statistical (coming from the matrix)

Mistags

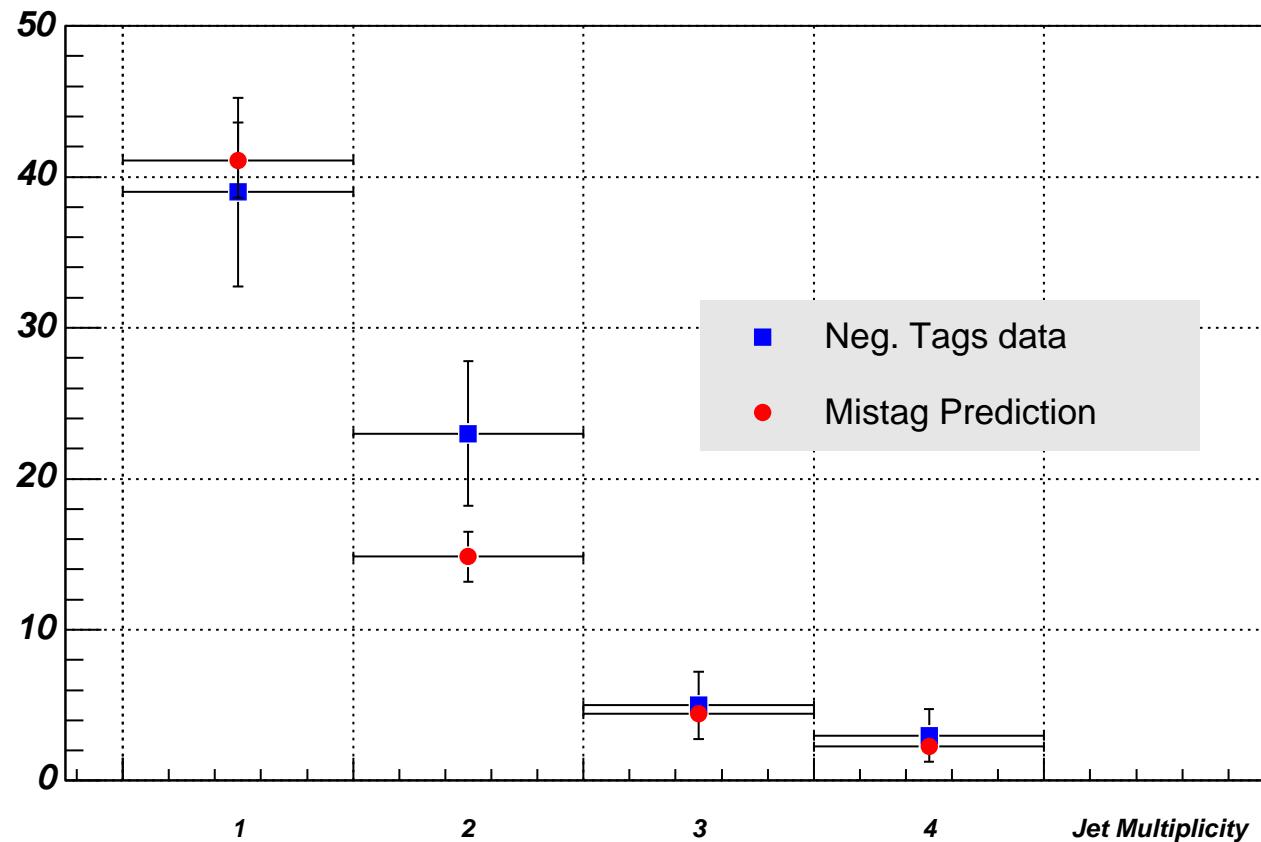
- Corrections:

- ◊ mistag rate for positively tagged jets is slightly higher than the negative tag rate \Rightarrow increase the error by a 20% factor (from SECVTX studies)
- ◊ mistag has to be scaled down by the fraction of pretag events which are due to Non-W background

Jet Multiplicity	1 jet	2 jets	3 jets	≥ 4 jets
Prediction $\times (1 - F_{Non-W})$ & error $\times 1.2$				
Mistag electrons	22.6 ± 5.2	8.19 ± 2.06	2.51 ± 0.60	1.21 ± 0.31
Mistag muons	16.6 ± 3.7	5.60 ± 1.54	1.49 ± 0.33	0.78 ± 0.17
Total	39.2 ± 8.6	13.78 ± 3.38	4.00 ± 0.91	1.99 ± 0.47

Mistags

- Comparison between tag rate matrix prediction and negative tags



Good agreement observed

Non-W Background

- Events where the lepton does not come from the decay of a W or Z boson (includes lepton and missing energy fakes, semileptonic B decays...)
- Extracted from the standard "MET vs ISO" method. We define 4 regions in the E_T vs. lepton isolation plane:
 - Region A: Iso > 0.2 and $E_T < 15$ GeV
 - Region B: Iso < 0.1 and $E_T < 15$ GeV
 - Region C: Iso > 0.2 and $E_T > 20$ GeV
 - Region D: Iso < 0.1 and $E_T > 20$ GeV
- In the non-isolated region, jets containing the lepton are not counted.

Non-W Background

- Pretag event counts in the E_T and isolation sidebands and fraction of non-W background in the pre-tagged sample

Jet Multiplicity	1 jet	2 jets	3 jets	≥ 4 jets
Pretag Events with Electrons				
Region A	23522	3692	541	69
Region B	18584	1800	222	32
Region C	615	243	61	19
Region D	7819	1202	201	61
F_{non-W}	0.062 ± 0.003	0.099 ± 0.007	0.124 ± 0.021	0.144 ± 0.049
Pretag Events with Muons				
Region A	7982	1404	180	31
Region B	3247	304	42	6
Region C	304	115	25	10
Region D	5729	880	117	33
F_{non-W}	0.022 ± 0.001	0.028 ± 0.003	0.050 ± 0.014	0.059 ± 0.034

$$F_{non-W} = (B \times C) / (A \times D)$$

Non-W Background

- We estimate this background with 3 different methods (errors are only statistical in all of them):
 - 1. Extrapolating from region B the tagging efficiency, we predict the expected number of tags from non-W events as

$$N_{non-W}^{tag} = F_{non-W} \times \epsilon_B \times N_{events}^D$$

Jet Multiplicity	1 jet	2 jets	3 jets	≥ 4 jets
Electrons				
F_{non-W}	0.062 ± 0.003	0.099 ± 0.007	0.124 ± 0.021	0.144 ± 0.049
B event tag rate	0.0148 ± 0.0009	0.029 ± 0.004	0.041 ± 0.013	0.188 ± 0.069
# events in D	7819	1202	201	61
N_{non-W}^{tag}	7.19 ± 0.52	3.49 ± 0.53	1.01 ± 0.36	1.65 ± 0.80
Muons				
F_{non-W}	0.022 ± 0.001	0.028 ± 0.003	0.050 ± 0.014	0.059 ± 0.034
B event tag rate	0.0200 ± 0.0025	0.053 ± 0.013	0.048 ± 0.033	0.167 ± 0.152
# events in D	5729	880	117	33
N_{non-W}^{tag}	2.48 ± 0.34	1.31 ± 0.35	0.28 ± 0.21	0.32 ± 0.34

Non-W Background

- 2. Calculating the tagged event rates in each sideband and dividing by the number of jets in the bin, the predicted tag rate per jet in the signal region

$$D \text{ Pred} = (\text{Tag Rate B} \times \text{Tag Rate C}) / \text{Tag Rate A} \quad (\text{tag rate / jet})$$

and doing the average over all the bins...

Jet Mult	1 jet	2 jets	3 jets	≥ 4 jets	Average
Electrons					
TR A/j	0.025 ± 0.001	0.025 ± 0.002	0.018 ± 0.003	0.018 ± 0.008	0.0245 ± 0.0008
TR B/j	0.0148 ± 0.0009	0.015 ± 0.002	0.014 ± 0.004	0.05 ± 0.02	0.0148 ± 0.0008
TR C/j	0.034 ± 0.007	0.027 ± 0.007	0.05 ± 0.02	0.07 ± 0.03	0.034 ± 0.005
D Pred.	0.020 ± 0.005	0.016 ± 0.005	0.04 ± 0.02	0.2 ± 0.1	0.019 ± 0.003
Muons					
R A/j	0.047 ± 0.002	0.043 ± 0.004	0.043 ± 0.008	0.02 ± 0.01	0.045 ± 0.002
R B/j	0.020 ± 0.002	0.026 ± 0.006	0.02 ± 0.01	0.04 ± 0.04	0.021 ± 0.002
R C/j	0.030 ± 0.010	0.07 ± 0.02	0.08 ± 0.03	0.05 ± 0.03	0.043 ± 0.008
D Pred.	0.013 ± 0.004	0.04 ± 0.01	0.03 ± 0.02	0.1 ± 0.2	0.016 ± 0.004

Non-W Background

so, finally, the predicted tagged events are

Jet Multiplicity	1 jet	2 jets	3 jets	≥ 4 jets
Electrons				
Pretag	486 ± 20	119 ± 8	25 ± 4	9 ± 3
Tag Rate	0.019 ± 0.003	0.038 ± 0.007	0.06 ± 0.01	0.08 ± 0.01
Predicted Tags	9.2 ± 1.6	4.5 ± 0.8	1.4 ± 0.3	0.7 ± 0.2
Muons				
Pretag	124 ± 8	25 ± 3	6 ± 2	2 ± 1
Tag Rate	0.016 ± 0.004	0.032 ± 0.008	0.05 ± 0.01	0.06 ± 0.02
Predicted Tags	1.9 ± 0.5	0.8 ± 0.2	0.3 ± 0.1	0.12 ± 0.07

Non-W Background

- ◊ 3. Using tagged events in all regions...

$$N_{non-W}^{tag} = (B/A)_{tagged} \times C_{tagged}$$

Jet Multiplicity	1 jet	2 jets	3 jets	≥ 4 jets
Electrons				
$(B/A)_{tagged}$	0.47 ± 0.03		0.31 ± 0.04	
C_{tagged}	21	13	10	5
N_{non-W}^{tag}	9.85 ± 2.26	4.00 ± 1.24	3.08 ± 1.06	1.54 ± 0.72
Muons				
$(B/A)_{tagged}$	0.17 ± 0.02		0.13 ± 0.03	
C_{tagged}	9	15	6	2
N_{non-W}^{tag}	1.56 ± 0.56	1.95 ± 0.68	0.78 ± 0.37	0.26 ± 0.19
Final result	11.41 ± 2.34	5.95 ± 1.41	3.86 ± 1.13	1.80 ± 0.75

- ◊ We will use the numbers corresponding to the last method and we will assign a systematic uncertainty of 50% which takes into account the difference between the 3 methods

W + Heavy Flavor (method 2)

- $Wb\bar{b}$, $Wc\bar{c}$ and Wc overall rate normalized to data
- For now, we use the heavy flavor fractions in W + jets events from the CDF note 7007 which includes a scale up factor of 1.5 ± 0.4 to correct the gluon splitting discrepancy between Jet Data and MC

Jet Multiplicity	1 jet	2 jet	3 jet	≥ 4 jets
1B	1.0 ± 0.3	1.4 ± 0.4	2.0 ± 0.5	2.2 ± 0.6
2B		1.4 ± 0.4	2.0 ± 0.5	2.6 ± 0.7
1C	1.6 ± 0.4	2.4 ± 0.6	3.4 ± 0.9	3.6 ± 1.0
2C		1.8 ± 0.5	2.7 ± 0.7	3.7 ± 1.0
Wc	4.3 ± 0.9	6.0 ± 1.3	6.3 ± 1.3	6.1 ± 1.3

- Errors are statistical + systematics

W + Heavy Flavor (method 2)

- We extract the HF tagging efficiencies applying JP to the Wbb, Wcc and Wc MC samples (includind the SF tagging efficiency)
 - ◊ We assume (for now) the same scale factor for b's and c's
 - ◊ We scale up the error for c-SF by 50%

Jet Multiplicity	1 jet	2 jet	3 jet	≥ 4 jets
1B(≥ 1 tag)	29.0 ± 3.8	27.5 ± 3.6	28.6 ± 3.7	28.4 ± 3.8
2B(≥ 1 tag)	0 ± 0	51.8 ± 6.8	48.5 ± 6.4	48.1 ± 6.3
1C(≥ 1 tag)	8.1 ± 1.6	7.9 ± 1.6	7.8 ± 1.6	7.7 ± 1.6
2C(≥ 1 tag)	0 ± 0	16.9 ± 3.4	15.5 ± 3.1	15.7 ± 3.2
Wc(≥ 1 tag)	8.4 ± 1.7	8.4 ± 1.7	8.2 ± 1.6	8.2 ± 1.7

Diboson, $Z \rightarrow \tau^+\tau^-$ and Single Top

- We calculate the number of events for each background as

$$N_{events} = \sigma \times \epsilon_{tot} \times \int L dt$$

- Acceptances and tagging efficiencies estimated by means of simulations
- Cross sections and Monte Carlo samples used for each process

Process	Cross Section (pb)	MC Sample	Events
WW	13.25 ± 0.25	atop4x	597399
WZ	3.96 ± 0.06	atop0y	191011
ZZ	1.58 ± 0.02	atop0z	242500
$Z\tau^+\tau^-$	254.3 ± 5.4	zewk1t	500000
Single top W^*	0.88 ± 0.05	ato0sp	239083
Single top W-g	1.98 ± 0.08	atop1s	262084

Diboson, $Z \rightarrow \tau^+\tau^-$ and Single Top

◊ Acceptances and tagging efficiencies for WW events

Jet Multiplicity	1 jet	2 jets	3 jets	≥ 4 jets
CEM Acc.	0.0351 ± 0.0002	0.0311 ± 0.0002	0.0066 ± 0.0001	0.00099 ± 0.00004
CMUP Acc.	0.0207 ± 0.0002	0.0180 ± 0.0002	0.00376 ± 0.00008	0.00052 ± 0.00002
CMX Acc.	0.0088 ± 0.0001	0.0075 ± 0.0001	0.00171 ± 0.00005	0.00026 ± 0.00002
Tag. Eff. (CEM)	0.026 ± 0.001	0.061 ± 0.002	0.083 ± 0.004	0.11 ± 0.01
Tag. Eff. (CMUP)	0.026 ± 0.001	0.059 ± 0.002	0.074 ± 0.006	0.10 ± 0.02
Tag. Eff. (CMX)	0.025 ± 0.002	0.061 ± 0.004	0.079 ± 0.008	0.13 ± 0.03

◊ Acceptances and tagging efficiencies for WZ events

Jet Multiplicity	1 jet	2 jets	3 jets	≥ 4 jets
CEM Acc.	0.0081 ± 0.0002	0.0096 ± 0.0002	0.0025 ± 0.0001	0.00038 ± 0.00004
CMUP Acc.	0.0052 ± 0.0002	0.0060 ± 0.0002	0.00142 ± 0.00009	0.00025 ± 0.00004
CMX Acc.	0.0025 ± 0.0001	0.0029 ± 0.0001	0.00058 ± 0.00006	0.00015 ± 0.00003
Tag. Eff. (CEM)	0.083 ± 0.007	0.136 ± 0.008	0.17 ± 0.02	0.19 ± 0.05
Tag. Eff. (CMUP)	0.072 ± 0.008	0.13 ± 0.01	0.18 ± 0.02	0.19 ± 0.06
Tag. Eff. (CMX)	0.09 ± 0.01	0.14 ± 0.01	0.14 ± 0.03	0.11 ± 0.06

Diboson, $Z \rightarrow \tau^+\tau^-$ and Single Top

◊ Acceptances and tagging efficiencies for ZZ events

Jet Multiplicity	1 jet	2 jets	3 jets	≥ 4 jets
CEM Acc.	0.00079 ± 0.00006	0.00082 ± 0.00006	0.00048 ± 0.00004	0.00016 ± 0.00003
CMUP	0.00125 ± 0.00007	0.00174 ± 0.00008	0.00055 ± 0.00005	0.00011 ± 0.00002
CMX Acc.	0.00065 ± 0.00005	0.00078 ± 0.00006	0.00027 ± 0.00003	0.00005 ± 0.00001
Tag. Eff. (CEM)	0.06 ± 0.02	0.15 ± 0.03	0.22 ± 0.04	0.2 ± 0.06
Tag. Eff. (CMUP)	0.08 ± 0.02	0.15 ± 0.02	0.17 ± 0.03	0.19 ± 0.08
Tag. Eff. (CMX)	0.11 ± 0.02	0.13 ± 0.02	0.26 ± 0.05	0

◊ Acceptances and tagging efficiencies for $Z \rightarrow \tau^+\tau^-$ events

Jet Multiplicity	1 jet	2 jets	3 jets	≥ 4 jets
CEM Acc.	0.00048 ± 0.00003	0.00021 ± 0.00002	0.0000030 ± 0.000008	0.000006 ± 0.000004
CMUP Acc.	0.00024 ± 0.00002	0.00011 ± 0.00002	0.0000030 ± 0.000008	0.000009 ± 0.000004
CMX Acc.	0.00012 ± 0.00002	0.00006 ± 0.00001	0.000009 ± 0.000004	0.000002 ± 0.000002
Tag. Eff. (CEM)	0.03 ± 0.01	0.07 ± 0.03	0.07 ± 0.07	0
Tag. Eff. (CMUP)	0.02 ± 0.01	0.08 ± 0.04	0.07 ± 0.07	0.3 ± 0.2
Tag. Eff. (CMX)	0	0.10 ± 0.06	0.3 ± 0.2	0

Diboson, $Z \rightarrow \tau^+ \tau^-$ and Single Top

- ◊ Acceptances and tagging efficiencies for s-channel single top events

Jet Multiplicity	1 jet	2 jets	3 jets	≥ 4 jets
CEM Acc.	0.0081 ± 0.0002	0.0167 ± 0.0003	0.0051 ± 0.0001	0.00105 ± 0.00007
CMUP Acc.	0.0047 ± 0.0001	0.0097 ± 0.0002	0.0027 ± 0.0001	0.00072 ± 0.00005
CMX Acc.	0.00176 ± 0.00009	0.0037 ± 0.0001	0.00104 ± 0.00007	0.00025 ± 0.00003
Tag. Eff. (CEM)	0.39 ± 0.01	0.634 ± 0.008	0.68 ± 0.01	0.69 ± 0.03
Tag. Eff. (CMUP)	0.41 ± 0.01	0.63 ± 0.01	0.66 ± 0.02	0.69 ± 0.04
Tag. Eff. (CMX)	0.39 ± 0.02	0.65 ± 0.02	0.72 ± 0.03	0.72 ± 0.06

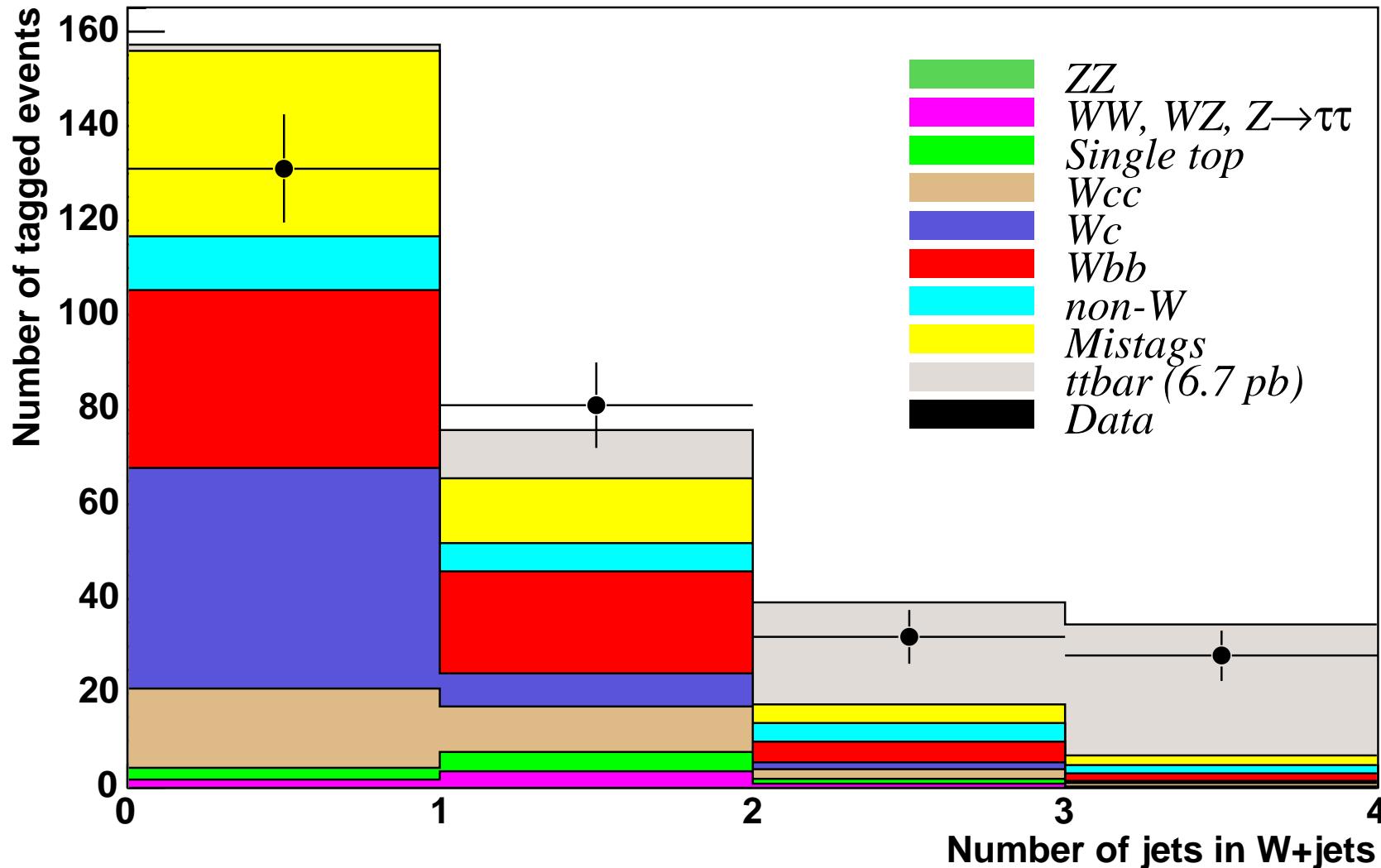
- ◊ Acceptances and tagging efficiencies for t-channel single top events

Jet Multiplicity	1 jet	2 jets	3 jets	≥ 4 jets
CEM Acc.	0.0141 ± 0.0002	0.0142 ± 0.0002	0.0027 ± 0.0001	0.00037 ± 0.00004
CMUP Acc.	0.0084 ± 0.0002	0.0089 ± 0.0002	0.00150 ± 0.00008	0.00026 ± 0.00003
CMX Acc.	0.0032 ± 0.0001	0.0032 ± 0.0001	0.00064 ± 0.00005	0.00005 ± 0.00001
Tag. Eff. (CEM)	0.359 ± 0.008	0.434 ± 0.008	0.50 ± 0.02	0.48 ± 0.05
Tag. Eff. (CMUP)	0.34 ± 0.01	0.45 ± 0.01	0.46 ± 0.03	0.57 ± 0.06
Tag. Eff. (CMX)	0.34 ± 0.02	0.43 ± 0.02	0.53 ± 0.04	0.6 ± 0.1

Summary of Background Estimate

Jet Multiplicity	1 jet	2 jet	3 jet	≥ 4 jets
MC Derived Backgrounds				
WW	0.753 ± 0.127	1.553 ± 0.259	0.437 ± 0.075	0.088 ± 0.017
WZ	0.539 ± 0.095	1.051 ± 0.180	0.319 ± 0.059	0.057 ± 0.015
ZZ	0.036 ± 0.008	0.078 ± 0.015	0.043 ± 0.009	0.009 ± 0.003
$Z\tau^+\tau^-$	0.473 ± 0.185	0.814 ± 0.256	0.172 ± 0.104	0.052 ± 0.053
Single Top (W^*)	0.538 ± 0.094	1.783 ± 0.312	0.558 ± 0.098	0.131 ± 0.024
Single Top (W-g)	1.907 ± 0.326	2.429 ± 0.414	0.498 ± 0.087	0.075 ± 0.015
Total	4.245 ± 0.774	7.708 ± 1.388	2.027 ± 0.382	0.412 ± 0.090
$W + HF$				
Wbb	37.52 ± 12.32	21.53 ± 6.80	4.43 ± 1.27	1.56 ± 0.50
Wc \bar{c}	16.77 ± 5.91	9.57 ± 6.64	1.96 ± 1.45	0.71 ± 0.53
Wc	46.74 ± 13.50	7.00 ± 2.06	1.48 ± 0.43	0.42 ± 0.13
Total	101.0 ± 29.5	38.10 ± 11.87	7.87 ± 2.38	2.69 ± 0.89
Others				
Mistag	39.2 ± 8.6	13.78 ± 3.38	4.00 ± 0.91	1.99 ± 0.47
Non W	11.41 ± 6.17	5.95 ± 3.29	3.86 ± 2.24	1.80 ± 1.17
$t\bar{t}$ (6.7 pb)	1.31 ± 0.20	10.14 ± 1.53	21.52 ± 3.26	27.67 ± 4.19
Total Background	155.85 ± 31.70	65.53 ± 13.43	17.76 ± 3.53	6.89 ± 1.57
DATA	131	81	31	28

Summary of Background Estimate



Cross Section Computation

- We calculate the $t\bar{t}$ cross section as

$$\sigma_{t\bar{t}} = \frac{N_{obs} - B_{bkg}}{\epsilon_{t\bar{t}} \times \int L dt}$$

- Iterative procedure to correct mistag and $W+$ Heavy flavor background predictions for $t\bar{t}$ contribution to pretagged sample applied
- Finally we get

$$\sigma = 5.82 \pm 1.21 \text{ (stat)} \pm 0.25 \text{ (MC stat)} \pm^{+1.27}_{-1.28} \text{ (syst) pb}$$

Cross Section Computation

- Sources of statistical and systematic uncertainties:

Error	Sys (%)	MC stat (%)	Stat from data (%)
Kinematic efficiency	8.7	1	
Scale Factor (b's/c's)	13/20		
Luminosity	5.9		
Non-W fraction	50		17
Non-W prediction	50		34
W+HF fraction/tags	30	14	0.8
Mistag	+20.0		9.6
MC derived (σ 's)	1.8	2.7	

- ◊ Errors are propagated considering correlations in acceptance, tagging scale factor and luminosity uncertainties
- ◊ Wbb and Wcc systematics are considered correlated across all the bins
- ◊ All the other errors are treated as uncorrelated

Conclusions

- We have made top ntuples (v.4) including JP information
- We have selected 59 $t\bar{t}$ candidate events that pass the $JP < 0.01$. We found a 75% overlap with SECVTX candidates and a 79% with Loose SECVTX
- The $t\bar{t}$ acceptance for JP is slightly higher ($\sim 9\%$ than for SECVTX). And we obtain similar fraction of mistags in the total background estimate
- Errors on efficiency and mistag matrix for JP are not optimized for this offline version.
- We obtain a $t\bar{t}$ x-section compatible with previous measurements and with a total error of 30% (22% syst)

Future Plans

- Main goal: Setup and optimize this analysis with gen5 and $\sim 400 \text{ pb}^{-1}$ of data and publish the result
- The list of future tasks includes:
 - ◊ Remake (and optimize) JP parametrizacion for gen5 (with the Florida group) **We need urgently Jet 50 MC with the right Silicon configuration**
 - ◊ Re-calculate efficiencies and mistag matrix and try to improve the errors
 - ◊ Optimize the x-section analysis
 - ◊ The aim is to be ready to start the analysis by the end of this year